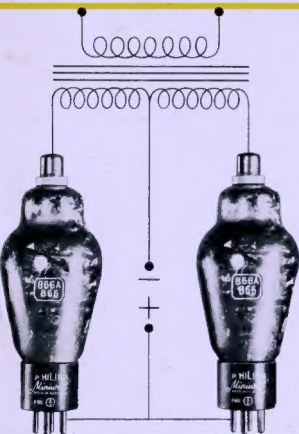


# AMATEUR RADIO

FEBRUARY

1946

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA



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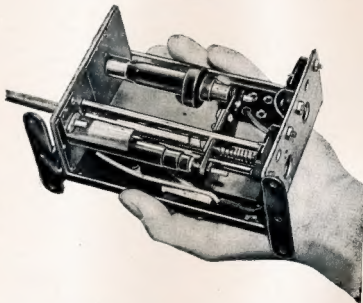
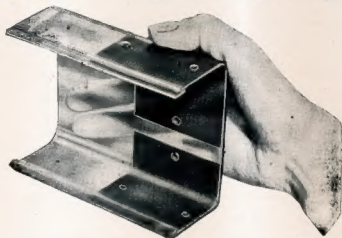
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## Editorial

The Federal Convention has been fixed for Easter to be held in Melbourne, the dates being Friday, 19th; Saturday, 20th; Sunday, 21st and Monday, 22nd, April.

As there has been no Federal Convention since 1939, this Convention may well prove to be the most important in the history of the Wireless Institute of Australia, and it behoves each Division to do their utmost to send a delegate.

Divisions are recommended to thoroughly consider the whole internal mechanism of the W.I.A. and to place any changes in constitution, etc., which they may consider necessary, on the Agenda.

It is then the duty of each Division to study carefully and discuss items on the Agenda, so that their Federal Councillor may obtain the feeling of the Division on any particular matter.

It is believed that in the past Divisions have instructed their Federal Councillor to vote "yes" or "no," leaving him no power to exercise his discretion.

This is an undesirable state of affairs, for Federal Council may place a completely different interpretation on that matter, and although the Councillor, already instructed how to vote, knows that his Division would agree—he has no alternative but to vote against it.

It should be left to the Federal Councillor to make the decision after the matter has been thrashed out by the Convention.

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## The Federal Constitution

The Wireless Institute of Australia will hold a Federal Convention in Melbourne at Easter this year, the first for six years. It is believed that the Federal Constitution will come up for considerable discussion at that Convention, and acting on a suggestion we are publishing the existing Constitution, so that Members may acquaint themselves of what the Constitution contains.

(As adopted, confirmed, and ordered to be distributed by the Fifteenth Annual Convention of the Institute holden in Melbourne, April, 1939).

1. NAME: The name of the Institute shall be "THE WIRELESS INSTITUTE OF AUSTRALIA."

2. OBJECTS: In general the objects of the Institute shall be to further the interests of wireless development in every way. The objects of the Institute are set out in further detail in the Articles of Association or Rules of the respective divisions.

### 3. CONSTITUTION:

#### (1) Divisions.

(a) The Institute shall consist of Divisions, one of which shall be located in each Wireless District, as constituted under the Wireless Telegraphy Act, 1905-1919, or any other Act amending or in substitution for the same. The Government of these Divisions shall be entirely domestic.

(b) Each Division shall consist of all Members, Associate Members, Junior Members, Associates, Student Members, Honorary Members, and Life Honorary Members elected or appointed in each Wireless District as aforesaid.

#### (2) Federal Executive.

(a) Federal Executive shall consist of: a Federal President, a Federal Vice-President, and a Federal Secretary, and any other officers, not exceeding two in number, and shall be appointed to specific positions from among the members of the Division, which is from time to time appointed by the Annual Convention, to be H.Q. Division. The appointment of these Officers by this Division shall be ratified at the Convention, or by vote of the Divisions, within one month after Convention. Such Officers shall hold office, until the next succeeding Convention, provided that in the event of a vacancy occurring in the Federal Executive by resignation or otherwise, it shall be competent for the H.Q. Division to appoint a successor. The said Federal Executive to be located in the one Division for not less than two consecutive years.

(b) The said Federal Executive shall carry out the directions of the Federal Council and shall, subject to such directions, be the body which shall carry into effect the policy of the Institute.

(c) The Federal Executive shall have the right to require any Division to do or omit to do any action if the performance or omission of performance of such action is deemed necessary or expedient in the interests of the Institute. The Division concerned shall have the right of appeal to the Federal Council hereinafter mentioned if such Division considers that the requirement of the Federal Executive is unwarranted or unnecessary. The decision of the Federal Council in this respect shall be final and binding on all parties: Provided that neither the Federal Executive nor the Federal Council nor any individual member of either such body shall be liable for damages or for civil or legal action, in respect of the exercise of any powers herein conferred.

(d) The Federal Executive shall submit at each convention a report of its activities since the last convention

### (3) FEDERAL COUNCIL.

(a) The Federal Council shall consist of one member from each Division who shall be elected by a majority of the members of such Division. The said Federal Council shall also include the Federal President, Federal Vice-President, and Federal Secretary. In the event of an equality of votes, the Federal President or Chairman, shall have the right to exercise a casting vote, but the Federal Vice-President and Federal Secretary shall be non-voting members.

(b) It shall be the duty of such Federal Councillor to record the vote of his Division on all matters referred to.

(c) The Federal Council shall have a definite mandate from all Divisions to execute or handle all matters referred to it by any Division and also all matters of a Federal nature and matters likely to affect more than one Division.

(d) All Divisions shall be required to advise the Federal Executive through their Federal Councillor of decisions, within a period of six weeks.

(e) The Division shall appoint a Federal Councillor, who shall hold office at the discretion of his Division. F.H.Q. shall be notified of such appointment at least seven days prior to each Convention. Any change in Councillor shall be immediately notified to F.H.Q.

### 4. MEMBERSHIP:

(1) Membership of the Institute shall be divided into grades as provided in the Articles of Association or Rules of the various Divisions.

2. (a) Within one month after the election, promotion, appointment or resignation of any person to or from any grade as prescribed in the Articles of Association or Rules of the respective Divisions such Divisions shall submit to the Federal Executive the name, address, grade of membership, and any other special particulars of such person. The Federal Executive shall keep a roll of Members of all grades.

(b) It shall be required that all Divisional Secretaries shall forward Federal Executive yearly, a statement showing numerical strength of his Division. These statements must be received by F.H.Q. by the 31st December in each year.

5. CONVENTIONS. There shall be held once in each year a Convention of the Federal Council or duly appointed proxies for the members thereof. Such Conventions shall be held at such times and in such places as the Federal Council shall decide. At such Conventions all matters submitted by Divisions or by the Federal Executive shall be discussed. Such matters shall be listed on an Agenda Sheet which shall be sent by the Federal Executive to each Division not later than one month before the date set down for the Convention. All decisions of the Conventions shall be binding upon the Institute and upon all Divisions and members thereof. All such decisions shall be circulated to all Divisions as early as possible after the closing of such Convention, and in any case not later than two months after such Convention.

6. **PROXIES.** In the event of any member of the Federal Council being unable to attend personally at any Convention it shall be competent for the Division concerned to appoint some other member of the Institute to act as proxy for the Division for the purpose of attending and voting at such Convention. All such appointments of proxies shall be in writing and shall be in duplicate, the original being given to the proxy so appointed and the copy to the Federal Executive. No proxy so appointed shall have any powers other than to act for the Division so appointing him at the Convention for which he is so appointed, and the appointment shall automatically lapse at the close of the Convention for which he is appointed unless the appointment shall have specifically authorised the said proxy to act for any longer period. Notwithstanding any such appointment of a proxy the member as proxy for whom he is appointed shall have the full rights, privileges, and duties of his position as a member of the Federal Council during the currency of such appointment of such proxy other than those of acting at such Convention. The appointment of any proxy may be cancelled by the Division so appointing him at any time by notice in writing sent to the proxy and to the Federal Executive. No proxy shall have any greater powers, rights, privileges, or duties than those of the member as proxy for whom he is appointed.

7. **VOTING:** At Conventions voting shall be by a show of hands or, if any member so desires, the Chairman shall direct that the vote be by secret ballot. The members of the Federal Council (or their duly appointed proxies) appointed by Divisions shall have the right of voting at Conventions. Provided that in the event of an equality of votes the Chairman shall have a casting vote.

8. **QUORUM.** At Conventions two-thirds of those entitled to vote as herein prescribed shall form a quorum.

9. **FINANCE.** The funds of the Federal Council shall be controlled by the Federal Executive, subject to any direction of the Federal Council. All receipts shall be placed to the credit of an account in a duly recognised bank and withdrawals shall be made upon the signature of the Federal Secretary and the Federal Treasurer of the Federal Executive appointed by the Federal Council. The books and accounts of the Federal Council shall be subject to audit by an auditor duly appointed. Such audit shall be made each year prior to the Annual Convention and a report upon the audit shall be submitted to the Federal Council for consideration at the next ensuing Annual Convention.

10. **CAPITATION.** At the close of its financial year, each Division shall forward to the Federal Executive, an amount equal to 1/- per member, by way of capitation fees.

11. **DIVISIONAL RULES:** Each Division shall furnish the Federal Executive with two copies of the Articles of Association or Rules of such Division and shall within one month after any amendment has been made in such Articles of Association or Rules furnish the Federal Executive with two copies of such amendment. All such Articles of Association or Rules and any amendment thereof shall be in accordance with the policy of the Institute.

12. **AMENDMENTS:** Amendments to these Rules shall be made only after notice of motion shall have been given to the Federal Council by any Division. Such notice of motion shall be referred to all Divisions by Federal Executive and the decision of the Divisions shall be communicated through their Federal Councilor to the Federal Executive within six weeks after the date of the notice referring the notice of motion to such Divisions. It shall be necessary for two-thirds of the Divisions to vote in favour of the motion before it shall be deemed to have been carried. Any Division not recording its

decision within the period of six weeks as aforesaid shall be deemed to have voted against the motion. Upon the receipt of the decisions of the Divisions or after the expiration of the period of six weeks as aforesaid whichever shall be the sooner, the Federal Secretary at the discretion of the Federal Executive shall notify all Divisions of the result of the voting by Divisions. Upon such notification the amendment, if carried, shall become and be a part of these rules.

13. **OFFICIAL ORGAN:** The Official Organ of the Institute shall be the Institute's own monthly magazine—"Amateur Radio." No Division of the Institute shall accept or use as its official organ, any other radio newspaper or radio magazine, either in conjunction with, instead of, or in addition to, the Institute's magazine "Amateur Radio." This shall not preclude the issue of Divisional bulletins.

14. **EFFECTIVE DATE:** These Rules shall come into force and have full effect as from the tenth day of April in the year of Our Lord one thousand nine hundred and thirty-nine.

## AMERICAN AMATEUR TRANSMITTER TEST

The following information is taken from the current issue of "Radio."

"The 1st annual Amateur Transmitter Contest is being inaugurated by Taylor Tubes Inc. of Chicago, Illinois, together with nine other radio-component manufacturers participants as an expression of appreciation for the outstanding work done by the thousands of Servicemen in the Communications branches of the military, and the many amateur radio operators, or 'hams.'"

"The prizes consist of two transmitters, designed by the contestants complete from microphone to antenna post, plus 1125 dollars in Victory Bonds, furnished by the participating manufacturers. Two prizes will be awarded; one in final power input classification up to 250 watts, and the other in the power input classification of from 251 watts to 1000 watts. The closing date is February 15, 1946."

No details of the actual contest are given, but one surmises that the entries are to consist of a design of a transmitter.

Australian radio component and tube manufacturers could well follow suit and inaugurate a similar contest for the benefit of the Australian Amateur—Editor.

## R.C.A. TO CONDUCT WIDE BAND TESTS

R.C.A. has received F.C.C. construction permits and licences for four new experimental class 2 portable stations to develop and test a system of wide band, multi-channel radio-communication, and to conduct other related experimental operations. In addition to observation on equipment performance, propagation on s-h-f will be studied under actual operating conditions. Analysis will cover horizon transmission path capabilities, diurnal, atmospheric and other influences on the communication ranges; characteristics during magnetic disturbances and lightning storms; seasonal variations in propagation with particular reference to refraction effects.—"Communications."



# Receiver Design for 28 Megacycles and Upwards

\* By J. K. RIDGWAY, VK3CR

We have received many requests for an article dealing with the problems associated with reception on the 28-29 mC band, from Hams who have been endeavouring to make their pre-war receiver work with some semblance of efficiency at these frequencies.

Now this is rather a large matter to be dealt with in one short article, so it has been decided to feature a special on the subject, dealing with both the theoretical aspect, and the practical design and constructional requirements. In this latter respect, two very efficient converters are in process of development and will be described shortly, whilst a complete receiver for 28 mC and upwards is being designed. This receiver is to be built around an intermediate frequency channel operating somewhere in the vicinity of 3-5 mC. It is hoped to be able to arrange for the manufacture of transformers of this frequency.

Most receivers designed for operation on lower frequencies fail to come up to expectations on 28 mC. Chief disadvantages appear to be, poor image ratio, low signal to noise ratio coupled with high inherent noise level, general lack of sensitivity, etc. Let us consider firstly the problem of image ratio. Image ratio is a direct function both of the intermediate frequency and the selectivity of the signal circuits. For any given intermediate frequency the mixer tube has a choice of two signal frequencies to produce the desired beat. Let  $F_s$  represent the signal frequency. For the oscillator frequency and  $F_i$  the beat or intermediate frequency. Then  $F_s$  plus  $F_o$  equals  $F_i$ , and  $F_s$  minus  $F_o$  also will equal  $F_i$ . In the case of 465 kC intermediate frequency, it does not require much calculation to see that two signals 930 kC apart can produce the desired beat. The use of 465 kC in present day receivers is a compromise between the selectivity and gain obtainable at the lower frequency and image ratio. On the lower frequencies it would be a simple matter to take care of this matter by simply increasing the selectivity of the signal circuits, but on 28 mC it is a different matter. Due to various causes, chiefly the damping effect on the tuned circuits by the low input resistance of the average R.F. pentode at this frequency, selectivity at 28 mC is particularly hard to come by. Obviously then, the solution lies in the use of a higher intermediate frequency. If a really good image ratio is desired, 3000 kC is to be recommended. The use of a higher frequency I.F. also removes another trouble which is very prevalent at the higher frequencies, that is locking of the oscillator with the signal frequency. Unless the isolation between mixer and oscillator input grids is good there is a tendency for the oscillator frequency to "pull in" with the signal frequency. The increased separation given by the use of 3000 kC intermediate frequency will overcome this trouble. The disadvantage of the use of the higher frequency I.F. lies in the reduced gain obtainable. It is usually necessary to use two or more stages of amplification to provide sufficient overall gain. The use of some of the newer high transconductance tubes such as 1852, 1853, 7G7/1232, EF50, etc., offer a satisfactory means of obtaining some of this amplification, for, although these tubes have a low input resistance with consequent associated damping of the input circuit, we can put up with a certain amount of this here. One very excellent idea which has gained a fair amount of prominence overseas is the use of two intermediate frequencies. Following the mixer tube there is a stage of I.F. at, say, 3000 kC, this takes care of the image response. Then comes another frequency converter which changes the frequency to 465 kC. If a crystal filter is fitted here the

problem of selectivity can be overcome. Although somewhat extravagant in the use of tubes, an I.F. system is obtained which fulfills all requirements. Care would have to be taken to ensure that stability was maintained.

## REQUIREMENTS FOR GOOD R.F. DESIGN.

Possibly the most common cause of failure to obtain good results from the R.F. end of the set at 28 mC and upwards is the use of unsuitable tubes. Standard type R.F. tetrodes and pentodes exhibit a very troublesome fault; that is, as the input frequency increases, so the grid input resistance decreases. It is quite beyond the scope of this article to describe in detail the reasons for this. Suffice to say that the main cause is due to what is known as "Electron transit time" losses. On the lower frequencies the time taken for an electron to travel from cathode to plate is but a very small fraction of one cycle of the applied input voltage waveform. Consequently the alternating current flow in the grid circuit due to the passage of electrons through the grid wires from cathode to plate, is almost entirely capacitive and leads the grid voltage producing it by a phase angle of 90 degrees. Hence there is no absorption of power in the grid circuit and grid input resistance is very high. As the frequency increases, the transit time of an electron from cathode to grid becomes an appreciable fraction of the grid voltage cycle. This causes the current flow in the grid circuit to be delayed and the grid current leads the grid voltage by an angle less than 90 degrees. In other words, a conductance component is introduced into the grid input admittance. This conductance increases as the frequency increases. Now every Ham knows that an increase in conductance means the same as a decrease in resistance. Therefore with normal types of valves having wide electrode spacings and consequently long electron transit time, the grid input resistance at 28 mC is very low. For types 6J7, 6K7, 57, 58, etc., the input resistance at 28 mC is of the order of 20,000 ohms. Now no sensible person would go to the trouble of designing and constructing an LC circuit of high Q and then deliberately shunt it with a 20,000 ohm resistance, which is virtually what we do when we use standard receiving tubes at 28 mC. Do not be misled by the figures and characteristics quoted for types 6AC7/1852 and 6AB7/1853 tubes. On first examination it would seem that these types offer the perfect solution to the problem. But unfortunately high transconductance in R.F. pentodes is accompanied by low grid input resistance. Consequently these tubes have about the lowest input resistance of any standard tube, with the result that the tuned circuit is damped to such an extent that selectivity is practically non-existent, and the effect of high Q LC circuits is almost entirely destroyed. The high transconductance of these types does however compensate to a small degree for these effects, but the only really satisfactory way out is to use tubes having small interelectrode spacing such as the acorn types or the newer bantam series types 9001-9003. Reference to Table 1 will show the difference in input resistance between standard and acorn tubes. Even at 14 mC there is ample justification for the use of acorns.

## INPUT RESISTANCE IN OHMS.

Frequency	954-9001	6K7-6J7	6AB7/1853	6AC7/1852
7 mC	4,080,000	220,000	188,000	118,000
14 mC	1,020,000	71,400	59,000	33,700
28 mC	255,000	21,000	16,800	9,500
54 mC	63,700	5,850	4,530	2,360

# An Economical Ten Watt Audio Amplifier

\*By R. J. COLLINS, VK3OI

Here is an economical ten watt amplifier using a minimum of parts, yet capable of excellent fidelity. Just the thing to have around the shack for experimental work. It is also capable of plate modulating inputs of twenty watts R.F. and would be just the thing for grid modulation of the hundred watt final.

Most Amateurs and experimenters can find a use for a good, economical and simple ten watt amplifier. Such a size is convenient for use as a high-fidelity radio-gram or radio-receiver amplifier, public address amplifier, or modulator for a low-power radio-phone transmitter.

The amplifier to be described uses two 6V6GT tubes in push-pull, Class AB<sub>1</sub>, fed by a 6SN7GT degenerative phase-inverter. Once section of the 6SN7GT is used as the phase inverter, and the other is available as a pre-amplifier. Alternatively a 6CS6, 6F5G, or 6J5GT can be used as the phase inverter; other triodes are also suitable. The plate supply voltage for the amplifier is only 250 volts at approximately 90 ma. The voltage gain of the amplifier from the input of the phase inverter tube (V2) to the input of the two 6V6GT tubes is 25 times, so that an input of 4 volts (rms) to the grid of the phase-inverter is sufficient to load the amplifier to full input.

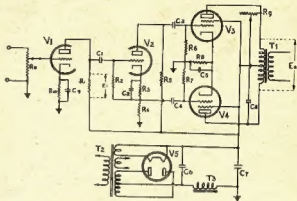
A conventional duo-diode-triode such as a 75, 6Q7G, or 6B6G as used in the detector first audio stage of a receiver, or the extra section of the 6SN7GT, if this tube is used as a phase-inverter, is capable of supplying sufficient input to the grid of the phase-inverter to load the amplifier to full output. The pre-amplifier tube, marked V1 in the diagram, may have a potentiometer volume control in its grid circuit, and the input may be the output from the detector of a radio receiver, crystal microphone, or pick-up.

Referring to the circuit (Fig. 1), the output of V1 feeds V2, which is connected in an inverse-feedback circuit. The output of V2 is split so that the voltage applied to the grids of the two 6V6GT tubes is separated by a phase-angle of substantially 180 degrees. (This effect is similar to that obtained with an interstage transformer having a centre tapped secondary winding). V2 may be any one of a number of triodes, provided the correct bias is applied by use of a suitable cathode-bias resistor. The gain of V2 is nearly independent of the tube type, because of the large amount of inverse feedback used.

In this circuit one half of the output of V2 is fed back to the input of V2. The stage gain with feedback is:

$$G_f = \frac{G_o}{1 + n G_o} \text{ where } G_o \text{ is the gain of the stage without feedback and } n \text{ is the fraction of the output voltage fed back to the input. Thus when } V_2 \text{ is a } 6SN7GT, G_o = 16 \text{ and } G_f = 1.78. \text{ With } V_2 \text{ a } 6SN7GT \text{ grid current does not flow until the peak value of the signal is approximately 40 volts.}$$

This phase-inverter circuit has a practical advantage in that the effects of possible variations between tubes in position V1 affect the input to each 6V6GT tube by the same amount. Because of inverse feedback and this particular phase-splitting circuit arrangement, variation between tubes in position V2 also have little effect on the symmetry of the input voltage to the grids of the 6V6GT tubes. For this reason specially selected tubes are not required, and age-ing of the tubes does not unbalance the circuit to any noticeable extent.



PARTS LIST.

- V1-V2—6SN7GT.
- V3—6V6GT.
- V4—6V6GT.
- V5—5Y3G.
- C1-C3-C4—.015 mfd 400v. (.02 also suitable).
- C2-C5-C9—10 mfd 20v. Electrolytic.
- C6—8 mfd. 525 Peak volt electrolytic.
- C7—24 mfd 350 Peak volt electrolytic.
- C8—.03 mfd 400v.
- R1—1 megohm  $\frac{1}{2}$  watt 10% tolerance.
- R2—1.0 megohm  $\frac{1}{2}$  watt 10% tolerance.
- R3-R10—7000 ohm  $\frac{1}{2}$  watt 10% tolerance.
- R4-R5—125 megohm  $\frac{1}{2}$  watt 10% tolerance.
- R6-R17—25 megohm  $\frac{1}{2}$  watt 10% tolerance.
- R8—165 ohm wire-wound  $\frac{1}{2}$  wat: 5% tolerance.
- R9—50,000 ohm Potentiometer.
- R11— $\frac{1}{2}$  or 1 meg. volume control.
- T1—Output transformer, centre tapped. 10,000 ohms impedance, plate to plate.
- T2—80 watt power transformer. Secondary 260-0-260v. rms at 100 milliamperes.
- T3—10 henry choke, about 100 ohms resistance.

From Table 1 it will be seen that the rise in d.c. plate and screen currents with power output is small, approximately 16 ma., hence a power supply with relatively poor regulation may be used without noticeable loss in power output. This, plus the fact that a d.c. supply of only 250 volts is required reduces the cost of the power supply, and makes power available for other tubes, such as r.f. and i.f. amplifiers if such a supply is at any time needed.

The savings from this economical amplifier and power supply might well be put into a good permag speaker—one with a magnet of from 20 to 40 ounces and capable of taking power inputs averaging 5 watts with peaks up to 10 watts. It is manifestly absurd to have a good amplifier feeding an inadequate reproducer.

The conventional dynamic with a field coil, normally used as part of the power supply filter is not recommended for these reasons:—

## FEDERAL HEADQUARTERS

**CONVENTION.** It has now been decided to hold the 1946 Federal Convention in Melbourne at Easter, which this year falls late in April. Good Friday, which will be the first day of the Convention, being the 19th April. It is hoped that each Division will be able to send a delegate rather than have to rely on a proxy, which arrangement, with all due respect to those gentlemen, is rather unsatisfactory. We feel, and we are sure the who have in the past consented to act in that capacity, members of the Institute will agree, that the first post-war Convention should be a fully representative one, and with a view to easing the difficulties of visiting delegates we recently asked the Victorian Division to call for volunteers among its members to act as hosts to the delegates, the idea being, of course, that several members should each provide accommodation in their homes (if any) for one visiting member. The response, we are pleased to report, was most gratifying, and we are now able to say that the accommodation problem is solved. Now we have only to swindle reservations on trains and/or planes for our Interstate friends. We know from wartime experience that such is not impossible.

Of great importance at Federal Conventions is the matter of Agenda Items. Divisions have been asked to forward these in time to reach FHQ not later than 1st March, so if any members have any ideas suitable for consideration at the Federal Convention they should contact their Divisional Secretaries without delay so that these already overworked people will have time to place suggestions before their Divisional Councils. We would like to remind you that the Wireless Institute of Australia is a wholly democratic affair, and therefore your ideas are just as welcome as the next fellow's, and entitled to just as much consideration.

**MEMBERSHIP.** We are able to announce that the Divisions which more or less faded out during the war are now once again on a solid footing. The rise in membership in these Divisions during the past few months has been most gratifying, and if present figures are any indication the Institute can look forward to a very high percentage of Australian Hams being members in the future. Which after all is as it should be—every Ham should be a member.

Although we do not like to make comparisons, and to do so without consideration of the numbers of potential members available, we consider that the efforts of the enthusiasts responsible for the re-organisation of the South Australian Division, are most noteworthy. Since last June, when this Division's membership was to all intents nil, the figure has risen to the rather surprising total of 152. When compared to the present totals in New South Wales—around 290—and in Victoria—334—we think you will agree that the VK3 gang are deserving of the heartiest of congratulations. Good going, VK3, and we hope you can keep up the good work.

Figures from the other "little brother" States are also cause for much satisfaction, starting from scratch, Tasmania has in the same time found 28 members among the very limited supply available in the Apple Isle, while up the Brisbane Line the Queensland Division has been able to net 65 members during the same period. Figures from the West are not yet available, but we have no reason to believe that the W.A. Division total will be any less satisfactory, local competition notwithstanding.

We note in passing, not, let it be said, in any way in connection with the above pleasant remarks (and without inference) that the smaller Divisions seem to be the first to come forth with their per capita payments!

**BROADCAST.** About 10th January, the Department of Information in Melbourne received a cable from United Press (U.S.A.) asking for information about the return to activity of Australian Hams. After cabling a reply setting out our temporary frequencies and advising that the re-issue of licences was in progress it was decided by D.O.I. that a short broadcast on the overseas service might go over well. A seven minute feature was decided upon and Alan Stowe, VK3AS, being a member of the technical staff of the A.B.C. was asked to assist. Alan, with the assistance of FHQ, promptly produced the required screed in professional style and record time. The result was not a seven minute but a sixteen minute feature which was radiated in the North American British and South East Asia transmissions on Friday the 18th and Saturday the 19th of January. The script commenced with a few introductory CQ's sent on the A.B.C.'s only buzzer, followed by a commentary read by well-known War Correspondent, Bob Burns, and rounding off with a short three-way interview between VK 3AS, VK3DH as an active Ham, and VK3VX as the Federal Secretary of the W.I.A. We regret that space limitations make it impossible to reprint the full script, but we publish herewith, by courtesy of the Department of Information and the Australian Broadcasting Commission, the commentary given by Bob Burns.

Among the first people affected by World War Two in this part of the globe were the Australian "hams," when on Saturday morning, September 2, 1939, the Government suspended all amateur transmitting licences and ordered sets to be dismantled and vital equipment seized. Next day Australia was at war.

Now restrictions have been lifted and already many licences have been re-issued. Before the war there were 2,000 "VK's" operating throughout Australia and the Mandated Territory but, according to members of the Wireless Institute of Australia, this figure will be greatly increased when conditions return to normal. General interest in short-wave work among both old-timers and new-comers is higher now than at any other time, and activity promises to be on a wider scale than pre-war.

Chief obstacle at the moment is the lack of high frequency equipment but, it is hoped, this position will be rectified soon. In the meantime, amateurs are working flat-out rebuilding sets with old equipment and generally making every effort to get back on the air in the shortest possible time.

At the present time the only frequencies that "VK" amateurs may use are 28 to 29 megacycles, 50 to 54 megacycles, 166 to 170 megacycles and 1345 to 1425 megacycles, with a power input of 50 watts. A wider range of frequencies has been promised by the Government, and it is anticipated that a return to lower frequencies will be made before the end of the year.

In Victoria (VK3 calls) now there are only 20 amateurs operating but the State's figures will mount rapidly as equipment becomes available. Before the war, Victoria had nearly 600 "short wavers" operating, while New South Wales (VK2 calls) led the field with about 700. Figures for other States were: Queensland (VK4), approximately 250; South Australia (VK5), 175; West Australia (VK6), about 100; Tasmania (VK7), about 70. Three stations in Papua, using VK4 calls, and about 10 in New Guinea, using VK9 calls, were also operating.

Of the 20 "hams" working in Victoria at present about 15 are operating on the 28 to 29 megacycle band but have been making only local contacts to date. A few American stations have been heard in this band, although it is not known whether any two-way contacts have been made.



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At the moment there is very little news of amateur activity in States other than Victoria. However, the few reports to hand reveal that frequency modulation and pulse transmission is creating a great deal of interest and operators are eagerly waiting for the official "go ahead." Television is another field that has many followers but high costs are expected to be a limiting factor in this experimental work among amateurs.

The war was a direct challenge to the amateur short-wave enthusiast of Australia and the glove was quickly picked up. From every part of the Commonwealth they rallied to the colors and for six long years served in practically every theatre throughout the world. The work, once just a pleasant, expensive hobby, was now a matter of national importance.

The training of a radio operator is a long, tedious business, but because of the practical and general technical knowledge of these men the process was greatly shortened. Not only did they serve in direct operational work, but they trained hundreds of young, inexperienced men so well that at the end of hostilities Australia and its armed services had one of the best radio communication set-ups in the world.

Of the 2,000 "VK's" operating before the war, 23 per cent. served with the Royal Australian Air Force, 18 per cent. with the Australian Military Forces, 6 per cent. with the Royal Australian Navy and Merchant Navy, 12 per cent. in the Service Reserves, A.R.P. organisations and auxiliary fire services; while the remaining 41 per cent. were either medically unfit for active service or retained in work of high priority in the reserved occupation class.

Large numbers of the latter class were engaged in communication work in Australia such as telephone and telegraph services and the technical side of broadcasting.

One of the most dramatic stories to come out of the war was provided by a "ham" attached to an Australian Commando unit serving in Portuguese Timor in 1941. He was well known to American amateurs before the war as VK7ML or Max Loveless.

7ML was attached to the Commandos, known as the "Sparrow Force," as a radio operator. Mister Nip was going well in those days and he reached Timor on February 19, crushing everything before him with the efficiency of a steam roller. The "Sparrow Force" wasn't crushed, but it was sadly bent, and eventually, against overwhelming odds, was forced to retreat into the hills. Loveless and four other Australian radio men lugged with them the wreckage of a small transmitter.

During the following two months Commando raiding parties collected scraps of wire, solder, odd pieces of tin, two mangled receivers wrecked by the Japs, and finally captured an engine driven battery charger with the fuel to drive it. From all this a sickly looking transmitter was evolved.

After many disappointments the transmitter went on the air when on April 19 Loveless dit-dahed Darwin. At first there was no response but on the second attempt Darwin cut in and "Sparrow Force," long given up as lost, were in contact with H.Q. again. "Ham" ingenuity had triumphed.

Loveless came through the war O.K. and is once again back at his old hobby.

American amateurs will be pleased to know that "Snowy" Campbell, call sign VK3MR, winner of many amateur contests, is another safely back in "civvies." "Snowy" enlisted in the R.A.A.F. He was shot down over Africa and "sweated out" the rest of the war in P.O.W. camps in Italy, Germany and Poland.

Another interesting personality back on the air is Max Howden, VK3BQ, the man who made amateur short-wave history on November 2, 1924, when he made two-way contact with America, the first trans-Pacific contact ever made. The American station was W6AHP. On November 24 of the same year he also made the first Australia-England contact, the English amateur being G2OD. Both contacts were made using morse, but on February 8, 1925, VK2BQ and G2OD were successful in a two-way contact using telephony both ways.

## RECEIVER DESIGN

(Continued from page 4)

So much for the R.F. stages, now let us discuss the mixer-oscillator stage. The choice of a mixer tube, particularly where no R.F. stage is used, is very important. Mixer tubes also suffer badly from low input resistance, particularly types 6L7 and 6J8G. Types 6A8, 6K8 and 6SA7 are not so prone to this effect and are to be preferred to the previously mentioned types at 28 mC. Unfortunately there are no true mixers in the acorn range. (Tube manufacturers please note), and although good results can be had from the use of types 954-9001 by using the suppressor for oscillator voltage injection, it is often found better to use a standard type tube and put up with the loading effect in order to realise the added gain from the higher transconductance of these types. If a separate oscillator is used the 6A8 makes quite a good mixer at 28 mC. The oscillator voltage should be fed to the oscillator grid (grid No. 1) and the oscillator plate tied to the screen. The 6K8 is also a very good mixer at these frequencies. Using this tube it is not necessary to use a separate oscillator as the 6K8 oscillates quite vigorously even up to 50 mC. This is due to good tube design, and also to the fact that oscillator grid current requirements for this type are low (max. 150 microamperes). Plate tuning of the oscillator is desirable. Another combination mixer-oscillator tube which should prove useful at 28 mC is the Philips ECH2. The oscillator transconductance of the ECH2 is 5,500 micromhos, whilst the pentode plate resistance is 1.5 megohms. This

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type has not actually been tried, but it is proposed to use it in an experimental model shortly and results will be reported in "A.R." Now the following may seem to be a very contradictory statement in view of what has previously been said regarding the 1852, but this type does make a very good mixer. True the input loading is quite high, but, provided that at least one R.F. stage is used, together with a high frequency I.F. the extremely high conversion transconductance obtainable from the 1852 (see graph 1) makes its use a very worthwhile one. It will be noted that grid injection is recommended. Unfortunately the suppressor characteristics of the 1852 require too high an oscillator voltage for suppressor injection to be used.

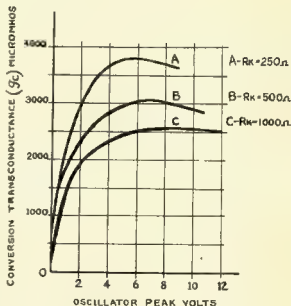
### 5AC7/1852 CHARACTERISTICS AS MIXER.

Er	6.3 v.	Es	150 v.
Ep	300 v.	Esu	0 v.

Eg.—Self bias from cathode resistor (Rk) as indicated on graph

Oscillator and signal voltages applied to signal grid.

However, provided that the high frequency I.F. is used there should be no troublesome effects from oscillator pulling. Now a word about H.F. oscillators. Tubes with a high mutual conductance make the best oscillators, type 6J5 is excellent at 28 mc. Another tube which is a particularly good oscillator is our old friend 1852, provided that the supply voltages are fed from a regulated supply. Voltage regulation is a good idea in any case. VR105 and VR150 types are being manufactured locally, so should be readily available. Wherever high oscillator voltages are required, do not overlook the possibilities of the audio pentodes and beam tetrodes 6F6's and 6V6's make excellent receiver oscillators, and can be made to operate with a minimum of trouble. It is advisable to use a grounded cathode circuit, for with the cathode at R.F. potential, much trouble is experienced from hum modulation of the oscillator voltage.



CHARACTERISTICS OF 1852 AS A  
FREQUENCY CONVERTER.

(Continued on page 16)

## HAMS ON SERVICE

I know many of you during your activities in the Services have read this column under many varied and strange conditions. It has, as I've stated at times been written at all kinds of queer hours of the morning, but I never at any stage, thought it would be typed by the aid of a hurricane lamp at 9.15 p.m. Strange indeed are the opening phases of this "New Order" business. It is to be hoped all the progress is not to be made in the present direction, Hi! Why, some chapie told me we would be on the air on January 1, and it's more than likely we will have to use Battery rigs all through 1946. Hi! (These notes were written for the January issue. —Ed.).

I had a pleasant surprise in a visit from Jack Coulter, 3MV, the other night. Jack's ship, the Mildura, is having a stay in Sydney for some alterations and some leave. Ending the story before I begin it, he rang me up during his leave as we had arranged that he come out and showed me a midget rx he had built. Well, at the time trams were travelling at half speed after 6 p.m. and he was as far from Eastlakes as he could get and all the journey was by tram. We reckoned it out that if he started early and left almost before he arrived here he should get back home at 1 a.m. or so. Hi! I have yet to see the receiver. The Mildura, like most of our pre-war interstate ships had a very busy wartime career, and she took part in many varied excursions, and Jack saw many places, but as he said in a letter he always arrived at a place just before he received "Amateur Radio" telling him what hams were in that location. The last trip of the Mildura was at the taking over at Hong Kong, and the number of mines made the entry far from unexciting. 3MV has a very interesting collection of photos and other items of interest, but is now mainly concerned in how to get on the air.

Tom Slawson, 2AFN, who spent years in the Nip P.O.W. camps, is reported in Uralla Hospital with stomach disorders. As Tom over the years survived Nips, Beri Beri, Dysentery and Malaria, he reckons that under Aussie hospital conditions, he'll soon be on 28 Mc. Apart from the tummy trouble, Tom is said to be quite fit and his old self.

Sqd. Ldr. Frank Goyen, 2UX, is yet another who is now out of the R.A.A.F. and trying to decide the usual question—whether to take all one's leave and have a nice long holiday, or to go to work early in one's leave period and save more shekels. Hi! On the phone I cannot report any progress "to the good" as a result of his years in the R.A.A.F. Hi!

Sgt. Alan Jocelyn, 2AJO, was just about to go into civvies when the M.O. decided that he had better first have a little spell in Concord A.G.H. Alan says it is a wonderful hospital and the view from the third floor would be lovely only from his bed he can just see his own home, and when he thinks of the gear and tubes awaiting his attention lest everybody else gets on "ten" first—he nearly has a relapse.

P/O Leo Myers, 2KS, was at the last meeting of the W.I.A. When asked to say something, Leo said he really had nothing to report, as he had "just gone here and there." Well, the Mentioned in Despatches, on his ribbons told us he'd "been here and there," in fact he had even "had a hand in the doings."—but—the silent service, said never a word. Hi! But I have slender hopes of the future (2YC).

C.P.O. Tel. Frank O'Dwyer writes from England that his discharge has come through, but as Frank says, "What's the use when one is 12,000 miles from home and the Australia is due to leave about the middle of December, anyway I hear that that Mrs. 3OF is now encouraging the back and front lawns and thinking out new garden plots—and of course a new fowl house. Hi!

Sydney Clarke, of the HMAS Shropshire, has arrived back in VK after his trip to see the Nips. He expects to return to them early in the new year. Syd says it was a very quiet trip with nothing to report, but he said "you should see Tokyo" or where it used to be. Syd is far more interested in the date of the AOCF than the navy at the moment. He has it all planned as to how he can sit for the Exam if the ship has left Sydney before due date.

VK3NQ, Jim Watson, "the old Bonégilla veteran"—31 years in one camp—announces that he has at last returned to Civvie Street. He rejoiced to find that all "in the precious box" were not all mashed together as he used to picture when things were very black. Hi! After four years of service life he, like all the rest of you, is finding this civvie business has its disadvantages—24d. postage, and the look on Mum's face when you pass back the plate for another piece of steak at breakfast—and it is even rumoured that the Tax People again take an interest in one—truly it's a savage life among civilians.

Ray Carter, 2HC, has also returned to civilian life at Yarraman, after his sojourn in Brisbane. He is not looking forward to the cold winters there, but like everybody else—glad things are over.

Bill Moore, 2HZ, is still in R.A.A.F. hospital at Jervis Bay with his fractured ankle, but expects to spend Christmas at home at Springwood. The ankle seems to be knitting properly and next year should see Bill back at the Water Board once more.

Sqd. Ldr. Frank Hine, 2QL, was down from Darwin again recently. He is not at the old position and his new job makes a trip per "Lib." to his home a much rarer event. So he is building up his gear for 28 Mc. Hi!

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**A TEN WATT AUDIO AMPLIFIER**

(Continued from page 5)

- (a) The field makes the speaker hot and tends to distort the voice coil, which rubs on the pole-piece.
- (b) The voltage to energise the field is additional to that required by the amplifier, makes the power supply more expensive, more likely to breakdown.
- (c) The flux through the voice coil is usually much more powerful with a permag, hence bass-note response is better.

The power supply can be included on the same chassis as the amplifier, but transformer and choke should be placed well away from V1 and V2 to prevent hum pick-up. Because the d.c. supply voltage is quite low, fairly large electrolytic condensers can be used—24 mfd 350 Pv cost little different from 8 mfd 600 Pv required with conventional amplifiers. Increased capacity in the filter condensers reduces the hum level of the amplifier.

It will be observed that this amplifier is not only very quiet (free from hum and noises), but it has a very wide frequency response and is free (because of degeneration) from transient "tails." With conventional amplifiers when there is a transient note, like the thump of a drum, there is a tendency for the speaker cone to rumble on for a few cycles at its own resonant frequency. This is the transient "tail," and it blurs the naturalness of the music. With the amplifier described these transient "tails" are practically non-existent. Because of the wide frequency response of the amplifier a tone control is usually desirable. This may consist of a .03 to .05 mfd fixed condenser connected in series with a 50,000 ohm one watt resistor from plate to plate of the output tubes. A variable tone control, or a step-by-step tone control may be used alternatively.

Data on circuit constants for other than 6SN7GT phase-inverter tubes will be supplied. Send a stamped addressed envelope to the Technical Editor, stating the type of inverter tube you wish to use.

TABLE I.  
6V6GT TUBES, PUSH-PULL AB1 OUTPUT

Heater voltage—6.3 volts  
Plate voltage—250 volts  
Screen voltage—250 volts.  
Grid bias—15 volts.  
Peak signal voltage (Grid to grid)—30 volts  
Zero signal plate current—70 milliamperes.  
Maximum signal plate current—79 milliamperes.  
Zero signal screen current—5 milliamperes.  
Max signal screen current—12 milliamperes.  
Load resistance plate to plate—10,000 ohms  
Power output—8.5 watts  
Total harmonic distortion—4 per cent  
Second harmonic distortion Nil  
Third harmonic distortion—3.5 per cent

**HAMS ON SERVICE**

And so to 1946. A Happy New Year to you all, whether home in Civvy Strail or only "on the way Home." Very many thanks to all, and every Ham who in 1945 helped to make Slouch Hats and Forage Caps the column for the Ham on Service and at Home, without your help it would have been impossible to produce and any credit is shared by all of you—73—and a host of notes from "those Returned" to 78 Maloney Street, East-lakes, Mascot, or if in Sydney, Phone MU 1092.

**CORRESPONDENCE**

The Editor wishes to acknowledge a letter from Peter Adams, VK2JX, expressing the same views as Alan Fairhall, VK2KB, in the December issue. As the letter is a lengthy one, the Editor has decided that, in the interests of space, not to publish it. Future correspondents are requested to keep their letters short.

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## DIVISIONAL NOTES

### NEW SOUTH WALES

Well, as predicted, quite a few stations in VK2 and VK3 were able to exchange greetings per medium of Amateur Radio. What a surprise the Yanks received to hear VK stations! Amid the general rejoicing of the lucky recipients there was general regret that the Department did not speed up the issue of licences so that every one should receive his call as a Christmas gift, but such is officialdom and it is very difficult to speed things up.

A.O.C.P. Classes are now in full swing after an initial setback. Applications became so numerous that after several modifications in the size of the class it became necessary to definitely refuse to accept more students. The Classes are being held in the rooms of the W.E.S.C., and Class Manager is Mr. Jack Howes, VK2ABS, ably assisted by Neil Piermont, VK2NQ, "Mac" Hicks, VK2ADV, Mrs. F. V. MacKenzie and several of her girls. Students are showing a keen interest in their work and even at this early stage it is confidently expected that the majority will secure their "Tickets" at the April examinations. Numbered among the students are several Servicewomen, and believe me, you chaps will have to watch your laurels.

During the month several very interesting overseas visitors have been entertained including Arthur Middleton, VQ2MI; VE4RL; VE4ALE; VE5EP and G8TB. All are anxious to get back to their respective countries and work many of the chaps they contacted whilst in this country. The VE's have had a Cook's Tour and hate to think how many miles they have travelled before they get back home. Every opportunity was given these chaps to meet and work as many VK's as possible and at one of these gatherings we had the pleasure of 2YC's com-

pany. Quite a few of you fellows know 2YC's pre-war views on phone. Believe it or not, Jim now thinks there's something in it and is very seriously contemplating acquiring some modulation equipment. All that has to happen now is the conversion of "Jonesy," 3RJ. What a world-shaking event it would be for a lone QSO to take place between 2YC and 3RJ!

Members will be pleased to learn that our ex-P.O.W.'s are looking themselves again, particularly 2HZ, who is almost back to his pre-war weight. Jim Edwards also looks in the pink and his comments in the "P's" should make very interesting discussion in certain quarters. Not a great deal has been seen or heard of Gordon Brigden.

Negotiations are at present under way for the acquisition of permanent rooms for the Institute and it is hoped that by the time you read this a one-time pipe-dream will have become a reality.

The Australian Radio Propagation Committee of the Radio Research Board of the Council for Scientific and Industrial Research are at present contemplating the issue of a monthly Propagation Bulletin and a perusal of an advance copy makes very interesting reading. This publication, which was previously for the benefit of the Fighting Forces, will now be made available to the general public. When the lower frequencies are returned it should be possible to work DX at any time of the day or night by consulting the various charts.

Not much news this month, chaps, as copy must be in the Editor's hands before the January General Meeting takes place. To remind you again. Monthly General Meeting of the Division now takes place in the Main Hall, Science House, on the FOURTH FRIDAY OF EACH MONTH. FEBRUARY MEETING WILL TAKE PLACE ON the 22nd Day of that Month.

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## VICTORIA

At the January meeting held in the Wireless Institute (Victorian Division) Rooms, Law Court Chambers, 191 Queen Street, City, on the evening of January 8, there was standing room only, the muster even occupied breathing space in the passage.

VK3XD occupied the chair and welcomed visitors, new members and KU3GG ex-AC8TS, who operated CW and fone on 14 Mc from Shanghai, and was subsequently seized by the J's for being suspected radio spy. He recounted some experiences which would make a DX fiend's log look green with envy. Other visitors were R. C. Harrie, VK5FL; A. J. Sutherland, VK5XB; P. T. Madlen, VK6MN. J. Squires, VK6JS; and Capt. Cadell, VU2EE, who is now VK3EE, and one of us. The following members were present and signed the book:—VK3's: WY, EE, XD, HX, CX, DH, KK, EA, FM, FQ, AI, AT, TU, TM, NY, RI, PW, XM, CT, VY, YQ, YL, WQ, FR, RN, IW, QV, MB, TZ, XE, HK, FS, ST, WO, ZJ, YJ, JI, DL, TF, LA, LX, HT, PG, IG, ZT, QA, OJ, HO, UJ, JO, CF, WF, DM, ED, JD, VH, IK, SZ, QP, XZ, CP, YP, BQ, UQ, QS, SQ, YS, NQ, XF, XT, CB, IF, XJ, CR; Messrs. H. D. Hanson, R. McDonald, J. S. Ware, M. Wilson, C. L. Coates, A. Dean, A. Simmons, C. M. Fraser, W. Dudman, L. Western, W. A. Shaw, B. Burdekin, T. House, R. Miller, H. M. Wald, K. Maroney, A. Camp, H. Waterman, R. Hodges, V. C. Seddon, C. P. Hill, J. Balfe, J. C. Belcher, H. Thompson, CPO. M. Hallows. — Bob Anderson, VK3WY, secretary, outlined an approach which had been made by FHQ re 54 Mc/c allocation, etc., for Frequency Modulation whereby a reply from the P.M.G.'s Dept. indicated that no information could be given yet as the Department was unable to cope with business in hand. This matter was the normal function of the Parliamentary Standing Committee on Broadcasting and the said Committee was still sitting.

Discussion took place re Federal Convention which is to take place in Melbourne during Easter, probable days being Friday, Saturday and Monday. It will be desirable to have everything ready for the accommodation of the delegates, also a little break. FHQ and all Divisions are said to be working at high pressure on the Agenda which should be in the hands of the Federal Secretary soon.

In order to explore the possibilities of holding a Dinner during the Federal Convention at Easter, members who are interested and would definitely attend are asked to contact the Divisional Secretary. The cost to any attending member cannot yet be fixed until such time as is known how many would be able to attend.

The November Amendment to the 1939 P.M.G. Regulations (published last month) were read, and various points explained to members, and general discussion re new types and grades of licences ensued.

On the motion of VK3XZ it was agreed to publish in the Magazine that "the Federal Constitution be printed for the information of all members and that the Constitution of W.I.A. in all other States be uniform in principle."

VK3W1 has paid the £1 and the gear is nearing completion for a try out on the air when it is anticipated that skeds be made for continuous operation. Herb. Stevens, VK3JO, needs capable assistance in the Laboratory Committee Section and those who can spare an evening or so are asked to lobby with him.

It was decided to organise a 50 Mc/c gang and those reported active include VK's 3YD; 3JO; 3YP; 3SF; and 3EO, but the more the merrier, and any others intending or who are actually using this channel please contact the above fellows.

The following reported being active on 28 Mc/c 3LX cw on 28120; 3ZT cw on 28560; 3EO cw on 28555; 3XD cw on 28575; 3EE cw on 28022 and 28644 3SQ 3UQ cw

# NEW COMPONENTS NEW RECEIVERS NEW IDEAS

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on 28240; 3NW on cw; 3BQ cw on 28022 and fone 28200; 3DH extra good fone; 3VM fone 28300 and 28200; 3XJ fone and cw 28040; 3SB fone 28070; 3YP fone and cw; 3CP cw.

These stations are among some of the very active and are desirous of co-operation from DX and locals.

During a discussion on fone v cw frequencies in the 28 M/c band and other bands not yet available whereby it was mooted "Keep fone on high frequency end and CW on the low frequency end of respective bands," VU2EB now VK3EE offered to loan his signal shifter. This piece of gear completely shifts all fone signals out of the band. Say, if this is as good as his auto sending gear, I will be pleased to borrow it. Hi. Technical Editor wants details please.

There seems to be some misunderstanding about the whole matter. When VK3YP moved the matter he was speaking from the CW man's angle. It appears that the majority of the meeting thought that he was speaking from the fone man's point of view.

The Instruction Staff of the A.O.C.P. Students has resulted in the appointment of Mr. Ken Ridgway, VK 3CR, and Mr. H. D. Hanson as joint Managers and Instructors. Mr. Hanson will deal with operating Code and Regulations; Mr. Edgar Treharne theory instructor, and Mr. George Thompson, VK3TH, as Advisory Consultant. (Now what did I tell you last month in these notes about the said George Thompson. Well done, OM, and glad to see you back working hard). Classes are to commence as soon as possible, and intending students should watch this magazine. Intending Students should notify the Divisional Secretary if they desire to attend the first class.

Another hard worker, whose services will be appreciated, has made a welcome return to the W.I.A. harness, is Group Captain Vaughan Marshall, VK3UK. He has commenced operations on Federal Executive, vice Billy Williams, VK3WE, who has reluctantly gone back to the

mountains. Well done, Vaughan, and thanks, Billy.

The following new members have been admitted as members of this Division: V. C. Taylor, A. C. Knight, J. R. Lancaster, W. McGrath, L. R. Ross, J. S. Woodburn, D. W. Tracey, A. L. Maclean, G. Wildman, K. F. Maroney, H. Waterman, J. Smith, J. E. Moran, L. Western, D. McKersher, W. A. Shaw, J. C. Davies, C. J. Bennett, K. C. Sennon, R. V. Rowe, J. S. Seare.

The Membership Secretaryship has been taken over by Mr. Ray Jones, VK3RJ, whose address is 23 Landale Street, Box Hill, to whom inquiries should be made, or to the Institute Box number, Box 2611W, G.P.O.

The February meeting of the Division will be held at the Rooms on Tuesday, February 5, at 8 p.m. The March meeting will also be held on the first Tuesday, the date being March 5th. Members, intending members, visitors and friends are all welcome.

## QUEENSLAND

The December meeting of the Institute was held a fortnight earlier than usual owing to the Xmas holidays, and as very little new business had come to hand the meeting resolved into an informal chinwag, which rather suited the holiday feeling which was taking possession of everyone. The main complaint of most members was the delay in the distribution of licence forms. Apparently those with like A. Appy will be the first on the air. But at the date of writing, the P.M.G.'s Dept. seems to be getting on with the job, more power to 'em. The parts position VK4 is rather acute, bleeder resistance being unobtainable to mention just one item.

The news of the month (or year) in VK4 is that H. Sholz, 4HR, has at long last succeeded in neutralizing his new 807 P.A. Keith Schleicher has also been getting ready for his return to the air and has been in a spot of bother with the same thing. Anyway as a result of their combined efforts we are happy to announce the early appearance of a treatise on the subject: "How to Neutralize your — 807". Under their combined authorship, this manual should be a worthy addition to the amateur's library. Congratulations, Professor Schleicher and Dr. Sholz, B.T. ("m" for Tube).

Although the writer, 4ZU, has not yet completed his receiving gear for 28 mc, we are told that there are some good VK2 and VK3 signals coming through and also some fair DX. It is to be regretted that our new bands are not in harmonic relationship with most of our old crystals and also with one another. That is one reason which will delay a few fellows' appearance on the air.

Several of our new members who intend to shortly sit for their tickets deserve every encouragement, particularly C. Reese and Wally Boulton. We had a visit from one of our country men over the holidays, the visitor being Frank Shannon, 4SN. Frank is of necessity a low power man, but has worked a tidy pile of DX with 7 watts and a Rhombic or should I say a Rhombic 7 watts. Some of the fellows here are having trouble getting their receivers perking on 10 metres and were wondering if the Tech. Editor could not run an article on say "Improving Receiver Performance on 10 metres."

We were rather distressed to hear via our old friend, Pat Kelly, last week that our late secretary, John Thorley, 4RT, had been having a bad time of it in a Sydney Hospital. John has been an inmate for 6 months or so, but we believe that the stay will not be much more prolonged and that you will be up and about soon. At all events, John, we extend our best wishes for a speedy and complete recovery.

To our country members who have recently joined up, glad to have you with us, and how about letting me have some notes for the magazine. Even if its only your own activities in the way of building gear, let me have it from time to time, because otherwise "Amateur Radio" notes become purely a Brisbane affair.

Next month we shall probably run a section "DX Worked," but until then it's 73s as CUL.

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## SOUTH AUSTRALIA

The past month has again demonstrated the increasing interest in Amateur radio in this State. Membership is now 134 and there was an attendance of over seventy at the January General Meeting, some members making special journeys from the country.

At the meeting, Mr. A. M. Phillips, VK5ZU, gave a talk on "Getting Started on the New Bands." Mr. Phillips was enthusiastic on "Five" in the old days, and has had considerable experience during the War in building and operating V.H.F. transmitters and receivers. His remarks, therefore, were based on a vast amount of practical knowledge and were followed with great interest by those present.

Some of the points made were:—

Conditions on 28 m.c. are "patchy."

Short skip on 14 m.c. is a guide to conditions on 28 m.c.

Most DX on "Ten" is over the daylight path, e.g. America in the morning, Asia around mid-day, Africa in the afternoon and Europe in the evening.

In planning a receiver the **main consideration** is shortness of leads.

In transmitters, avoid capacity coupling of stages.

Antennas should be designed for low angle radiation. The simplest antenna, therefore, is the half-wave vertical, which can be two half-waves in phase with matching stub and non-resonant feeders.

A discussion took place at the conclusion of the talk and Mr. Merv. Brown, VK5MB, moved a vote of thanks to the lecturer.

During General Business, the request by "Amateur Radio" for articles was again mentioned, and the suggestion made that lecturers at meetings be asked to write up their talk in the form of an article or, alternatively, make their notes available to the Technical Committee of this Division, who would "lick them into shape." Since the meeting, Mr. Phillips' notes have been received. Though concise, they are so clearly expressed that they are being forwarded to "Amateur Radio" in their original form.

Recently returned from the Services and present at the meeting were R. G. Haskard, VK5RH; W. E. Lloyd, VK5HD; and Howard Stacey, VK5XA. Visitors were R. B. Monfries, VK9RM, and Eddie Jinks, VK2HX. Other old Hams it was good to see again included Hal Austin, F. E. Bentley, VK5MK; Phil Bested, VK5CS; Geoff and Jack Coombe; L. W. Finn, VK5SP and Jack Grivell, VK5BK.

Several Amateurs in this State have now received their Licences. These are high up in the alphabet. The writer of these notes, a "wubble-u", has, consequently, a very low "priority."

Student classes have been well attended and there is already a rush of applications for the next series, due to commence in March next.

The next General Meeting is to be held on Tuesday, 11th February, when the Lecturer will be Mr. Merv. Brown, VK5MB.

## TASMANIA

This Division held its January meeting on the 9th (a week late owing to the New Year falling so close to the first Wednesday). Time, 8 p.m. as usual and preceded by the monthly Council Meeting.

Attendance this month was down, many being on holidays and others claimed by their work. Twelve members were present and the Council just managed a quorum.

Several apologies were received including President, VK7LJ, who is relaxing (we hope). Information was received from the P.M.G.'s Dept. re the Advisory Committee setting out the duties and notifying the desire for the Committee to function as from January 1st. W.I.A.

enrolments are so good that it is believed the Department is finding it difficult to get the "non-Institute Member" half of the Committee—what other State boasts this position?

A copy of operating regulations were read and several variations from the old regulations noted and discussed, as was a copy of the letter reaching licence applicants in which the paragraph on Broadcast Receivers was particularly commented on.

One pleasing factor was the advice that the lower frequencies were to be made available later as the Services relaxed. This at least gives us hopes of the return of Interstate chinwagging with a little DX thrown in sometimes and should allay the worst fears.

Three more members were enrolled in the persons of VK7BQ, VK7CM and A. Morrisby. Rumour once had it that 7BQ, Len Crooks, would not be a starter, and as one VK7's Old Timers, it is pleasing to have him with us still. (Just in case readers are unaware of the fact, these notes are written by VK7PA—Ed.).

The meeting was rounded off by Chas. Oldham, VK7XA, with a talk on Frequency Checking, which proved to be most interesting, dealing with the ever popular simple absorption wave meter on to the heterodyne frequency meter combining both in determining the correct harmonic of the Meter.

Lecher Wire Calibration for the U.H.F. and V.H.F.'s raised much discussion, some of the technicalities remaining unanswered—at least for the time being.

The whole subject proved to be one that contained a wealth of interest to all from the discussion that followed the conclusion, and could well be taken again at a later date.

Reports are to hand of an imposing antenna recently erected in preparation for "The Day," 86 feet of heavy

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The finished job constitutes two works of art, one the assembling, the other the erecting. It now stands atop a high tension insulator at its location. To the many comments made, Bert's (ex-VK6AR) satisfied retort was "well we got it there."

If it repeats its receiving tests in transmitting it should be worth the effort, etc., from all accounts by Bert.

Several licence fees have already gone along following receipt of notification to applicants that their licences are available on receipt of the prescribed lucre, others still, are "waiting" restlessly.

The February meeting will take place on the normal day, the first Wednesday, the 6th, and the March meeting will also fall on the 6th. The address is as before 92 Liverpool Street, Hobart, upstairs.

## RECEIVER DESIGN

(Continued from page 9)

Much could be written on the subject of high frequency stability, and it must be borne in mind that mechanical design and sensible layout contribute a large portion of the success to be achieved. Use good quality tuning condensers—the best that you can get. Make sure that there is no end or side play in the rotor shaft. See that the wiping contact to the rotor is a good one (for heaven's sake do not use pigtails). Make sure, if you are ganging two or more condensers, that they are perfectly in line.

Return all earth connections to a common point for each stage. A bus bar earth line at 28 mC can cause a lot of trouble. Mount the tubes in the most convenient position for short grid and plate leads, preferably horizontal on the shield partition. Coils wound with 14 gauge wire, self supporting, and soldered direct into circuit will give more efficiency than plug in coils. In short, care taken in the form of efficient layout will pay dividends in the form of increased efficiency.

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## A Midget Communication Receiver

Through the courtesy of Captain T. Cadell, VU2EB, we were privileged to view a midget communications type receiver developed for Military use in certain actions.

The receiver is a standard superheterodyne using the midget type tubes, operating from 230 volts AC or DC, or from a special battery pack.

Two units—counting the battery pack—three, comprise the whole setup. The first unit consists of the receiver which contains as a tube line-up, a 1R5 Mixer; 1T4 oscillator; 1T4 IF; 1T4 second detector; and another 1T4 in the output. Plug in coils are used, and they plug into one end of the receiver. These coils are actually one end of the receiver box, having pins which plug into corresponding sockets.

The frequency range is covered by four coils comprising 100-1600 KC; 2.5-5 MC; 4.5-8 MC; 8-15 MC. On the side of each coil unit is a calibrated scale, calibrated both in kilocycles and megacycles against dial readings, and which are extremely accurate.

Regeneration is introduced into the IF stage to provide oscillation for the reception of CW. An audio gain control is provided, which together with the tuning control, one has only three controls to play with. An antenna tuning device is also provided which makes it possible to match up practically any type of aerial. The output impedance from the audio is 800 ohms.

We stated at the beginning of this article that this was a midget receiver and to substantiate this statement, the actual measurements of the receiver case is 9½ inches x 2½ inches x 3½ inches.

The second unit consists of the power supply. The physical size is the same as the receiver, and as we have stated operates from 230 volts AC or DC. Rectification is achieved by means of a dry metal rectifier; the filtered output of which is 97.5 volts. 90 volts is provided for the plate supply, and 7.5 volts for the filaments of the tubes which are connected in series.

The performance of this little receiver is outstanding.

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